Röchling

Industrial

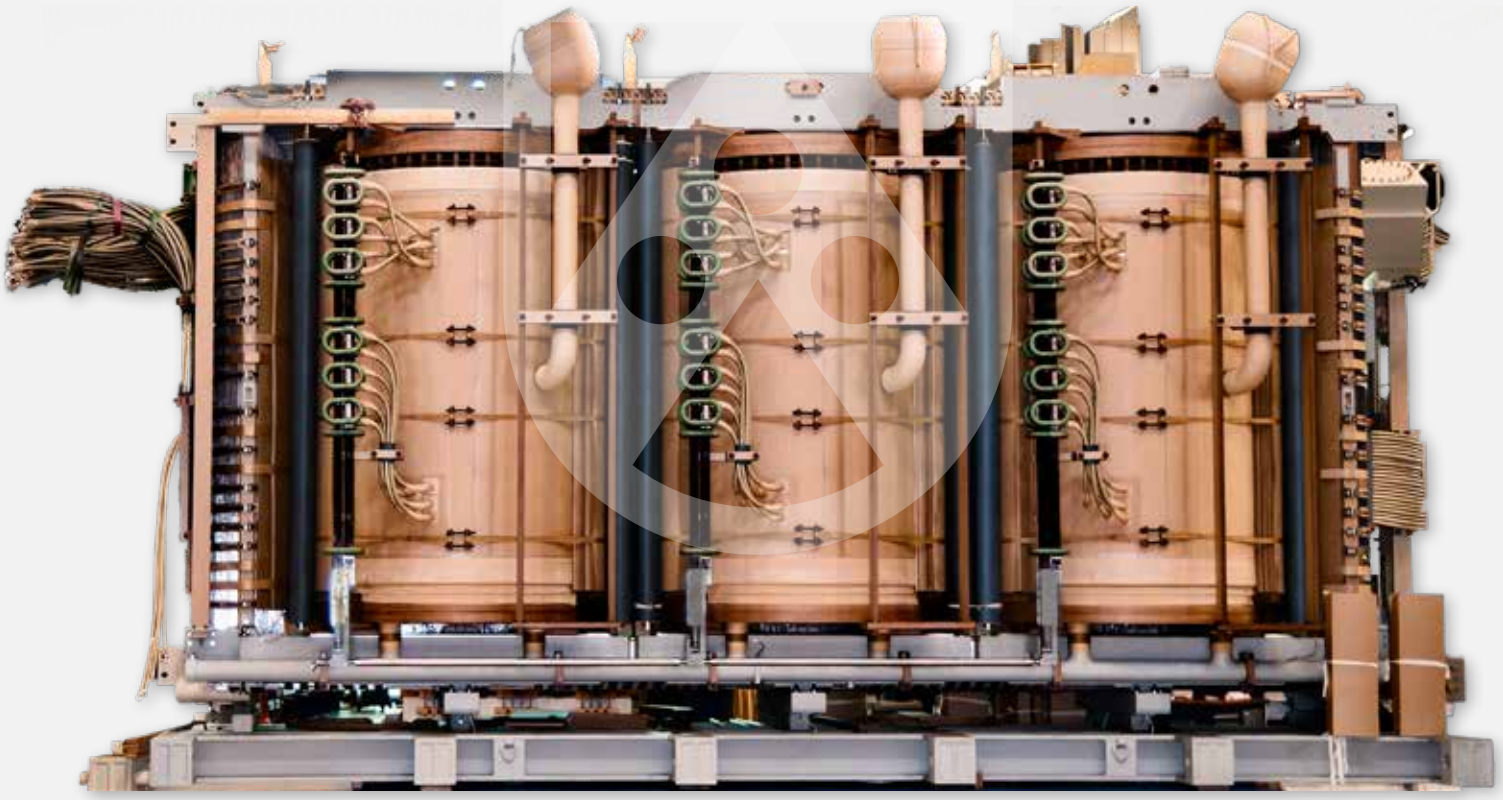
High performance insulation components for oil-filled transformers

One stop supplier:

- **Lignostone® Transformerwood® – laminated densified wood**
- **Trafoboard® – laminated pressboard**
- **Durostone® CR – fibre reinforced plastics**

Electrical Industry

Proven in transformers for decades



Premium insulating composite materials

For oil-filled transformers

There is barely any other machine or system that poses as high requirements to constructors as a transformer. They have to be operationally safe and reliable for a long time even at high operating temperatures and high electrical stress. Manufacturers must plan sizing and design with care. A defect in the insulating material leads to irreversible damage in the transformer. Besides a loss in income and premature short-term new procurement a failure of operations can lead to massive blackout, disastrous for all people relying on the electrical grid.

Our premium insulating composite materials are specifically developed for these requirements. They meet the highest dielectrical and thermal requirements and have been used within transformers **for more than 60 years.**

Let us design the standards of tomorrow's transformers

Our insulating materials are developed for the reliable electrical power supply of tomorrow.

- Improve the performance, and efficiency of your transformers
- Increase the lifetime of your transformers
- Increase the operational safety and reliability
- Reduce transformer design thanks to more resistant material
- Rely on sustainable solution and supplies worldwide
- Benefit from expertise in material properties in transformer application

Materials

With Lignostone® Transformerwood® laminated densified wood, Trafoboard® HD-PH laminated pressboard and Durostone® fibre-reinforced plastics we offer you a unique range of premium composite materials for different requirements and designs. They will support you in the development of high-performance, reliable and safety transformers.

Developed and approved together with our worlwide customers.

Proven in transformer designs around the world.

Areas of application

Manufactures and engineers use our materials in transformers with different requirements and for different areas of application. This includes:

Power transformer

Furnace transformer

Traction transformer for trains

Distribution transformer

High quality through technical know-how

R&D cooperation with the University of Applied Sciences in Osnabrück

In contrast to all other suppliers worldwide, we have well-founded, scientifically accurate proof of the electrical properties of our materials. We work closely with the High Voltage Laboratory of the Hochschule Osnabrück – University of applied sciences, where we regulary test the partial discharge inception properties of our electrical insulation materials.

Member of the TRANSFORM

As a member in the TRANSFORM partner network of European premium suppliers for the transformer industry, we help you to design the standards of tomorrow's transformers.

Own high-voltage & materials laboratory

We have our own laboratories for performing mechanical and electrical testing (up to 200 kV under oil). Thus our products always meet international standards.

Consultation

Depending on the design of your transformer and the parts requested different materials will fit best for your application. We are looking forward to assist you in the selection of the right material. This can reduce material costs, processing costs and problems in the application.

Engineering

In our in-house CAD department, we develop the design of your components together with you. Our experienced technicians and toolmakers will coordinate with you on the feasibility and the highest possible fulfilment of the requirements for your individual application. Own tool and fixture construction allows very high flexibility for a variety of tasks.

Prof. Dr. Eckart Buckow (right), Hochschule Osnabrück – University of applied sciences, and **Hans-Jürgen Geers**, General Manager Technology & Marketing at Röchling Industrial, examine a material sample of Lignostone® Transformerwood® in the Laboratoy of the Hochschule Osnabrück

One stop supplier

International network

Our one-of-a-kind, international network of companies within Röchling Industrial provides you with a wide range of material as well as outstanding industry know-how and machinery.

Unique range of materials

With Lignostone® Transformerwood® laminated densified, Trafoboard® HD-PH laminated pressboard and Durostone® fibre-reinforced plastics we offer a unique range of materials specifically suitable for the different and demanding requirements of transformers.

Machined parts & semi-finished products

We have our own machining factories, warehouses with semi-finished products and qualified partner companies on the spot worldwide. This allows personal counselling, short routes and quick delivery times.

Large dimension up to 5,500 mm length and 3,400 mm width

Large sheets and tangentially layered rings allow the production of large-sized, one-piece components, such as pressure rings and beams, with high mechanical strength and exact specific weight.

Our site in Haren/Germany with more than 320,000 qm

Made in Germany

We have been manufacturing sheets rings and finished parts for transformers at our site in Haren/ Germany for more than 60 years.

Lignostone® Transformerwood®

Laminated densified wood for oil-filled transformers

Buy from the inventor and world market leader of laminated densified wood

We have been producing Lignostone® for more than a century. With Lignostone® Transfomerwood® we offer a proven material that has been used in transformers for over 60 years and meets the electrical and thermal requirements even after decades in service. The material enjoys an excellent reputation in the international transformer industry.

Very good oil absorption

Due to its continuous capillaries Lignostone® Transformerwood® can be dried very quickly and filled with oil air-free. This reduces the energy consumption and ensures a high dielectric without partial discharge for Lignostone® Transformerwood®.

Moisture content < 5% due to controlled production process

The lower moisture content reduces the drying time during the vapourphase and thus saves energy and costs. In addition, it reduces the risk of corrosion of metal parts of the active part of the transformer. You are buying wood, not water!

Good electrical insulation properties

We have our own laboratories for performing mechanical and electrical testing (up to 200 kV under oil). Thus our products always meet international standards.

100% metal detected

During its manufacturing Lignostone® Transformerwood® is tested with modern metal detectors up to four times on potential dangerous metal inclusions. Each veneer is metal checked.

Inventor: We are the inventor of laminated densified wood. With more than 100 years of experience in processing of products made of laminated densified wood, our knowledge of the material, its potential and its performance is second to none.

Market leader: We are the world's largest manufacturer of laminated densified wood and the market leader for insulation components made of laminated densified wood in electrical engineering.

Conserve valuable resources

We only purchase rotary cut veneers for manufacturing Lignostone® from suppliers who are certified in accordance with the regulations of the Forest Stewardship Council (FSC) FSC® product chain. The Forest Stewardship Council (FSC) based in Bonn is an international non-profit organisation that promotes the environmentally friendly and economically viable management of forests. For this purpose, it has developed standards based on which companies can be certified. FSC® chain of custody certificate ensures that the products of certified companies are made from responsibly sourced raw materials. For this purpose, companies have to streamline their processes and procedures in such a way that the traceability of the raw materials used is ensured and that statements can be made regarding the raw materials used in the product.

Reliable even after 30 years

Insulation materials need to last between 30 and 40 years in the demanding environment of a transformer. Lignostone® Transformerwood® has proven that it is up to the task. Tests were carried out on components that had been installed in a transformer in Grohnde Nuclear Power Station in Lower Saxony/Germany for more than 30 years, and the results were outstanding. All values for flexural strength, compressive strength, electrical strength and modulus of elasticity on the level of new material values... Even after 30 years, the material was still entirely reliable.

Ask your supplier for long-term results!

What is special about Lignostone® Transformerwood®?

Lignostone® Transformerwood® is a laminated densified wood according to IEC 61061. It consists of red beech veneers, which are joined together with thermosetting synthetic resins under high pressure and heat. Selected red beech veneers from highest quality are used. Of all known timbers the wood of the red beech (Fagus sylvatica) has the best electrical and mechanical characteristics with respect to the use as insulation material in oil-filled transformers. These trees only grow in Europe. The peeled veneers used for Lignostone® Transformerwood® are subject to stringent quality specifications and come from sustainable forest management.

No patched veneers

For our standard sheet size we use only complete veneers in the production. This leads to a more homogenous material, which increases the electrical and mechanical properties of laminated densified wood. Random overlaps lead to predeterminded breaking points. Additionally, the random stacking can cause air bubbles, since the hollows can be filled with resin. The resulting inhomogenous density within the laminated densified wood increase the electrical failure probability.

Only complete veneers are used for standard sheet size

Röchling is not using patched veneers

Key to identification

	Key	Explanation	
Degree of density	L	Low density	Specific gravity: 0.70 – 1.10 g/cm³
	M	Medium density	Specific gravity: 1.10 – 1.30 g/cm³
	H	High density	Specific gravity: 1.30 – 1.40 g/cm³
Lamination	I	Parallel	
	II	Crosswise	
	X	Tangential	
Veneer thickness	2	≥ 2 mm	
Resin	E3	Resin for electrical applications	
Veneer quality	(SQ)	Standard quality	Field strength E at onset of PD: **3.3 kV/mm**[1)] **Fulfills** the requirements of IEC 61061
	(HQ)	High Quality	Field strength E at onset of PD: **4.7 kV/mm**[1)] **Surpasses** the requirements of IEC 61061
	(TQ)	Top Quality	Field strength E at onset of PD: **5.1 kV/mm**[1)] **Surpasses by far** the requirements of IEC 61061

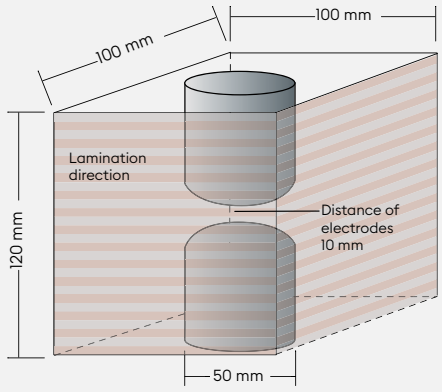
Example: LII/2-E3 (SQ) means:

- Low density
- Crosswise lamination
- Veneer thickness ≥ 2 mm
- Electric type
- Standard quality

1) 1% probability Weibull distribution. The measuring sensitivity for all measurements of PD was < 2 pC

Partial discharge test (PD)

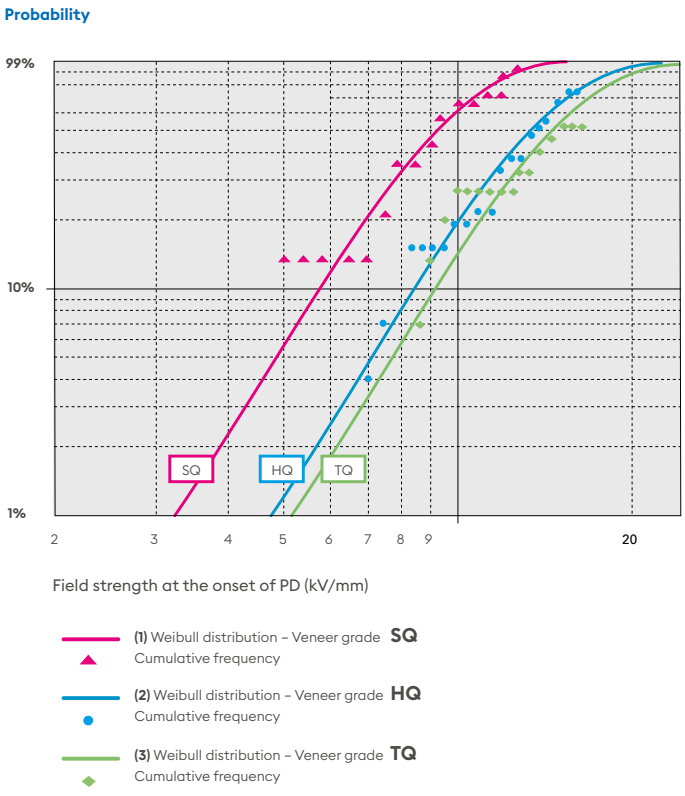
PD test set-up



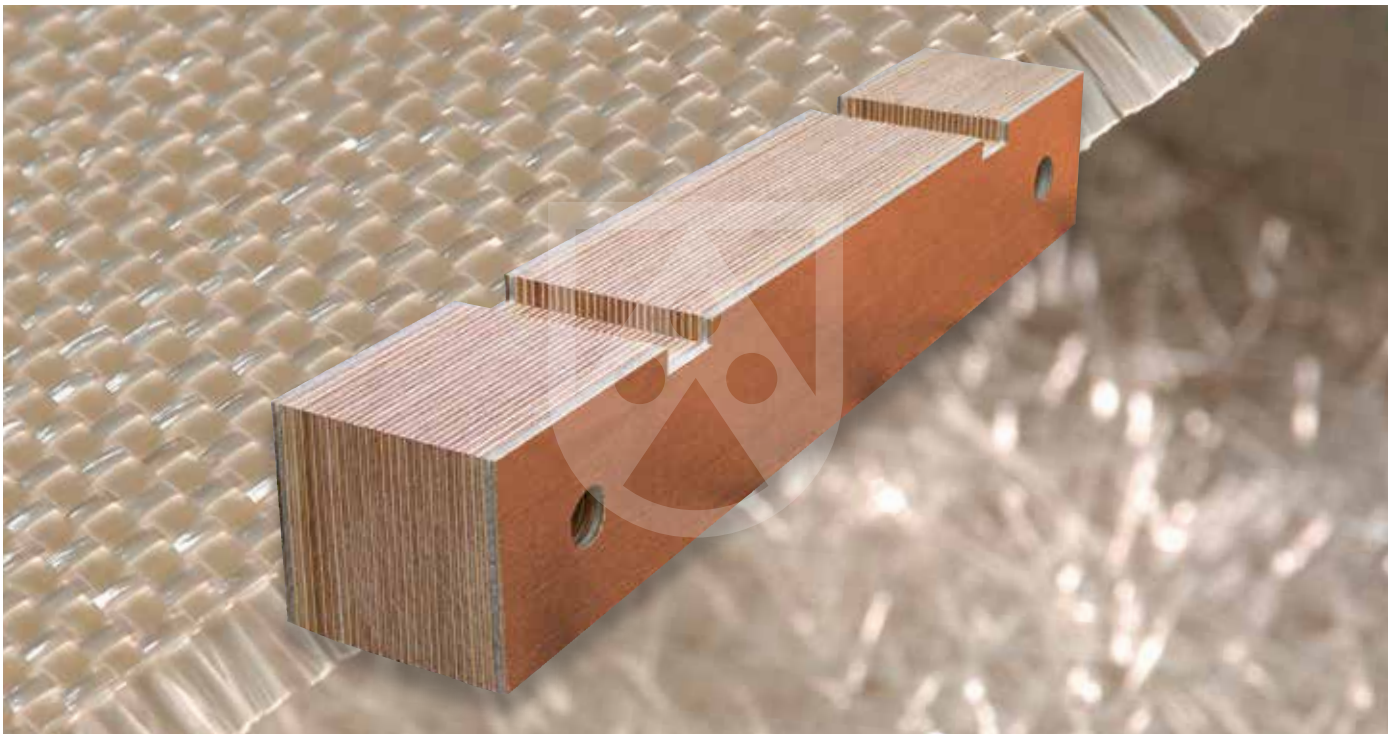
Sizes of the test sample

Testing of PD under oil (Shell Diala D)

Test results



(Source: Hochschule Osnabrück – University of applied sciences)



Lignostone® – next generation for higher requirements

With our development competence and unique material know-how we have further developed Lignostone® specifically for transformers with high requirements. Meet the next generation of laminated densified wood: Lignostone® Transformerwood® Hybrid and Lignostone® UHV.

Lignostone® Transformerwood® Hybrid – improved mechanical properties

One big advantage of Lignostone® Transformerwood® is the high mechanical strength. Röchling improved this by up to 40% by adding FRP-layers.

Benefits:

- Higher mechanical strength without changing dimensions
- Possibility of design optimisation in associated with high cost savings by dimension reductions
- Reduction of size and weight
- Higher stability of coil clamping

Characteristics:

- Improved flexural strength
- Improved stiffness
- Less deflection

Lignostone® UHV – for highest electrical requirements

Lignostone® Transformerwood® UHV (ULTRA HIGH VOLTAGE) is a grade with a very high dielectric strength at the level of laminated pressboard (IEC 60763). In combination with the higher mechanical strength, especially in comparison to the laminated pressboard, the new grade leads to new possibilities for the transformer designer.

Benefits:

- More compact design
- Resistant to overload operations
- Improved efficiency
- Improved performance
- Improved lifetime management

Characteristics:

- Improved dielectric strength
- Improved flexural strength
- Improved stiffness
- Improved compressive strength

Our delivery programme – Lignostone®

Over the decades Lignostone® Transformerwood® has proved an indispensable construction and insulating material, particularly for power and distribution transformers and ideal for these applications. Common components made of Lignostone® Transformerwood® are:

- Top and bottom coil clamping rings or multi-sectional pressure parts
- Platforms
- Pressure beams
- Lead and cleat support
- Step blocks
- Shield rings
- Potential rings
- Pressure blocks
- Fasteners

Sheets

- 2,000 x 1,000 x 10 to 120 mm
- 2,000 x 1,200 x 10 to 120 mm
- 2,000 x 1,300 x 10 to 120 mm
- 2,000 x 1,600 x 10 to 120 mm
- 2,400 x 2,000 x 10 to 120 mm
- Other sizes on request
- Maximum size up to 5,500 mm length and 3,400 mm width
- Thickness up to 300 mm

Coil clamping rings

- Single piece up to 3,400 mm in diameter with tangential or crosswise lamination
- Thickness up to 400 mm

Pressure beams

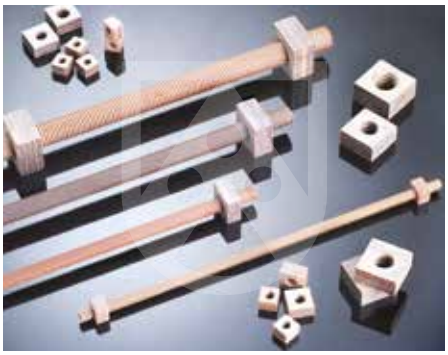
- Single piece up to 12,000 mm in length fully machined
- Thickness up to 300 mm

Machined components

- The fabrication of CNC machined components as per drawings is our strength.
- We utilise versatile modern CNC, special and automatic machines.

Round rods

- Standard length: 2,000 mm
- Diameter 6 to 28 mm



Fasteners

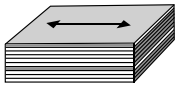
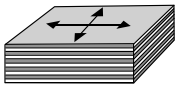
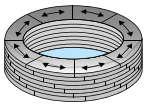
- M8 – M24 ex stock
- Standard length: 1,000 mm

Square nuts

- M8 – M24 with H = D ex stock

Nominal diameter	SW mm	e1 mm	h mm
M8	14	20	10
M10	19	27	10
M12	24	34	12
M16	32	45	16
M20	36	51	20
M24	46	65	24

Technical data for Lignostone®

	Designation		Röchling	LI/2-E3[3) 4)] (SQ), (HQ), (TQ)	MI/2-E3[3) 4)] (SQ), (HQ), (TQ)	LII/2-E3[3)] (SQ), (HQ), (TQ)	MII/2-E3[3)] (SQ), (HQ), (TQ)	LX/2-E3[2) 3) 5) 6)] (HQ), (TQ)	MX/2-E3[2) 3) 5) 6)] (HQ), (TQ)
			IEC 61061	P1R	P4R	C2R	C4R	T2R	T4R
			DIN 7707	KP 20212	KP 20214	KP 20222	KP 20224	KP 20242	KP 20244
	Standard	Sample size	Unit	Parallel packed		Cross packed		Tangential packed	
									
Specific gravity	IEC 61061	–	g/cm³	0.85 IEC 61061: 0.7–0.9	1.25 IEC 61061: 1.2–1.3	0.95 IEC 61061: 0.9–1.1	1.25 IEC 61061: 1.2–1.3	0.95 IEC 61061: 0.9–1.1	1.25 IEC 61061: 1.2–1.3
Mechanical properties									
Flexural strength[1) 7)] ⊥	DIN EN ISO 178	500 x 20 x 20 mm Support distance: 320 mm	MPa	140	200	110	130	130	180
Modulus of elasticity in flexure[1) 7)]	DIN EN ISO 178	500 x 20 x 20 mm Support distance: 320 mm	GPa	11	16	9	11	11	16
Compressive strength ⊥	DIN EN ISO 604	10 x 10 x 10 mm	MPa	100	120	200	230	120	140
Compressive strength ∥				55	90	70	90	80	100
Physical properties									
Oil absorption	IEC 61061	–	%	30	7	25	7	25	7
Moisture content	IEC 61061	–	%	5	5	5	5	5	5
Operating temperature limit	–	–	°C	105	105	105	105	105	105
Electrical properties									
Volumen resistivity	IEC 60093	–	Ω x cm	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}
Electric strength 90 °C ⊥	IEC 60243	–	kV/3 mm	SQ: 45 HQ: 50 TQ: 55	SQ: 45 HQ: 50 TQ: 55	SQ: 45 HQ: 50 TQ: 55	SQ: 45 HQ: 50 TQ: 55	HQ: 50 TQ: 55	HQ: 50 TQ: 55
Electric strength 90 °C ∥	IEC 60243	–	kV/25 mm	SQ: 70 HQ: 80 TQ: 90	SQ: 70 HQ: 80 TQ: 90	SQ: 70 HQ: 80 TQ: 90	SQ: 70 HQ: 80 TQ: 90	HQ: 80 TQ: 90	HQ: 80 TQ: 90
Dissipation factor 50 Hz/25 °C	IEC 60250	100 x 100 x 10 mm oil impregnated	tan δ	0.01	0.01	0.01	0.01	0.01	0.01
Relative permittivity	IEC 60250	100 x 100 x 10 mm oil impregnated	εr	3.7	4.1	3.7	4.1	3.7	4.1

Remarks

1) Direction A, the fibers of the outside veneers must run in the longitudinal direction of the specimen.
2) Mechanical values depend on the average ring diameter.
3) Corresponding reduction and safety factors are to be taken into account when dimensioning insulating components. For mechanical loads please consider the support span to thickness ratio. For the performance of the mechanical and electrical tests the specimens were treated according to IEC 61061-2 Item 3.
4) Parallel laminated types contain up to 20% transverse fibers.
5) Tangential laminated rings have up to 20% radial grain.
6) Sample size for flexural strength and modulus of elasticity in flexure is 120 x 15 x 10 mm.
7) Parallel laminated types must be present in the tension zone at least four longitudinal layers.

⊥ = parallel to the lamination

∥ = perpendicular to the lamination

The data mentioned in this brochure are average values ascertained by current statistical returns and tests. The above data is provided purely for information and shall not be regarded as binding unless expressly agreed in a contract of sales.

Trafoboard®
Trafoboard® HD-PH

Laminated pressboard

With Trafoboard® HD-PH we offer a high-quality laminated pressboard for insulation components in oil-filled high-voltage transformers. Trafoboard® HD-PH represents a high level of quality, excellent electrical and mechanical properties, high chemical purity and close tolerances.

Trafoboard® HD-PH is designed for highest electrical requirements in the active part of the transformer. Thanks to the high-quality phenolic resin system for bonding the pressboard layers, it leads to new possibilities and higher reliability for the engineers.

Trafoboard® HD-PH has a density of 1.15 – 1.35 g/cm^3 and consists of highly densified pressboard layers made of pure cellulose according to IEC 60641, which are bonded permanently by means of phenolic glue according to IEC 60763-3-1 type LB 3.1A.2.

Properties

The material combines very good mechanical and electrical properties, and is characterised by a very low moisture content and very good drying behaviour. We worked closely with Osnabrück University of Applied Sciences in its development.

High strength, even at high operating temperatures

Trafoboard® HD-PH has very high mechanical strength, even at high operating temperatures of up to 120 °C.

Low shrinkage behaviour and high homogeneous strength

The low moisture content leads to a good drying behaviour during kerosene drying behaviour. The reduced shrinkage leads to an improved dimensional stability.

No styrene evaporation during machining

No styrene evaporation during machining. Unlike polyester bonded pressboard, Trafoboard® HD-PH does not produce unpleasant smell during processing, which can cause health problems for employees.

Dielectric strength

Trafoboard® HD-PH is characterised by the particularly high partial discharge-free dielectric strength due to the premium resin system which is used in the gluing process. In cooperation with Osnabrück University of Applied Sciences, which has a modern high-voltage laboratory with a measuring accuracy < 1 pC, the extremely high dielectric strength has been verified.

Our delivery programme – Trafoboard®

Machined components

The production of CNC machined components with close tolerances as per customers' drawings is our strength. We utilise versatile modern CNC special and automatic machines.

Components thicker than 120 mm on request.

Dimensions:

- 4,150 x 2,150 x 10...120 mm
- 4,000 x 1,500 x 10...120 mm
- 3,200 x 2,100 x 10...120 mm
- 2,000 x 1,000 x 10...120 mm
- 2,000 x 2,000 x 10...120 mm
- 2,000 x 1,500 x 10...120 mm
- 3,150 x 3,100 x 10...120 mm

Rings

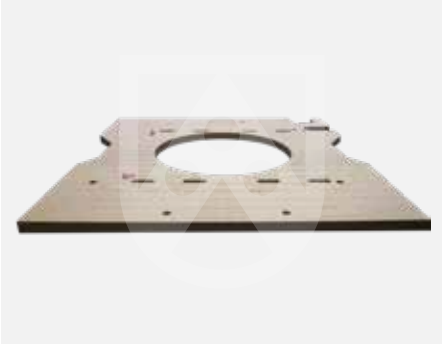
- Up to Ø 3,100 mm
- Fully machined according customer drawings – customized design

Fasteners

- Standard size: M8 – M24

Moisture-free, appropriate packaging

We deliver Trafoboard® HD-PH fasteners in moisture-free, appropriate, small packaging units. Due to the material, laminated pressboard absorbs moisture and is inclined to swell. With the special packaging, the fasteners are reliably protected against moisture and remain dimensionally stable.



Platforms

- 3,150 x 3,100 x 10...120 mm

Technical values for Trafoboard®

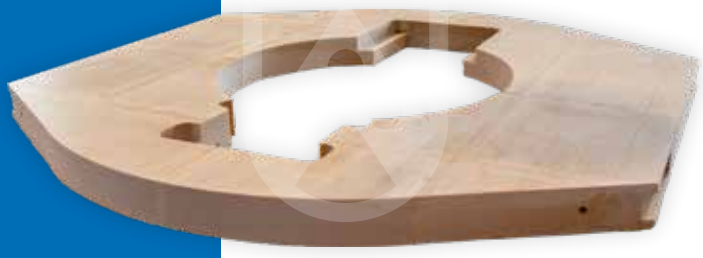
			Test method	Unit	Trafoboard® HD-PH
Glue type			–	–	Phenolic
Type according to			IEC 60763	–	LB 3.1A.2
Density			IEC 60763-2	g/cm³	1.15 – 1.35
Mechanical properties	**Flexural strength**	⊥	DIN EN ISO 178		
	Machine direction	MD		MPa	120
	Cross machine direction	CMD		MPa	110
	Flexural modulus of elasticity	⊥	DIN EN ISO 178		
	Machine direction	MD		GPa	13.0
	Cross machine direction	CMD		GPa	10.5
Physical properties	**Shrinkage**		IEC 60763-2		
	Machine direction	MD		%	0.20
	Cross machine direction	CMD		%	0.30
	Thickness			%	1.50
	Compressibility		IEC 60763-2		
	Compressibility	C		%	2.6
	Reversible part of compressibility	C_{rev}		%	93
	Moisture content		IEC 60763-2	%	≤ 5
	Oil absorption		IEC 60763-2	%	10
	pH of aqueous extract		IEC 60763-2	pH	6.5
Electrical properties	**Conductivity of aqueous extract**		IEC 60763-2	mS/m	7.1
	Electric strength in oil[1]	∥	IEC 60243-1	kV/mm	≥ 9

Remarks
1) Sample size: 50 x 10 x 10 mm
The data mentioned in this brochure are average values ascertained by current statistical returns and tests. The above data is provided purely for information and shall not be regarded as binding unless expressly agreed in a contract of sale.

7,000 qm composite machining shop in Haren

Durostone® CR

Fibre reinforced plastics



Platform made of Durostone® CR: improved mechanical properties and reduced clamping ring thickness

Urban living is the dominant life-style of the future. By 2050, two thirds of the world population will live in cities. This leads to an increasing demand for energy in the same space. Therefore, transformers with the same or smaller dimensions but with higher capacity are needed. Additionally, the need for mobile transformers is increasing while aged transformers are replaced. Both developments require transformers to be compact and more resilient.

This leads to higher requirements for the construction insulation materials in the active part of the transformer. With the challenge of increasing power density, higher temperatures are required. This results in the need for high-temperature insulation materials. Especially for this requirement we have developed our fibre reinforced material Durostone® CR. **CR – Compact & Resilient.**

Excellent rigidity at up to 180 °C

Durostone® CR combines high dimensional stability with extreme strength even at high operating temperatures up to thermal class H (180 °C).

Resistant to ester fluid and mineral oil

Durostone® CR has a very high chemical resistance and is compatible with ester fluid and mineral oil.

Dielectric strength

The dielectrical strength without onset of partial discharge properties from Durostone® CR are very good, as external tests at the Hochschule Osnabrück – University of applied sciences confirm.

No shrinkage

Since the material is not hygroscopic, components made from Durostone® CR retain their original dimensions during drying in the vapor phase oven. This allows to calculate the dimensioning with precise tolerances.

New possibilities for your transformer design: Since Durostone® CR is available in large dimensions it can be used as a clamping ring with a diameter of up to three meters, for very high mechanical requirements. Beams and fasteners with a length of more than 5 meters are available. It can replace steel beams due to its very high stiffness of up to 30 GPa, which reduce eddy currents in the beam and gives more freedom in the HV-Design.

Benefits:

- Higher efficiency
- Higher performance
- More compact design
- Overload operations
- Improved lifetime management

Steel replacement possible

Durostone® CR offers solution for highest requirements even at large dimensions. The extremely high mechanical strength also makes steel replacement possible, since Durostone® CR is available in large dimensions. Compared to steel the electrical properties of GFRP offer more freedom in HV-design and lower stray losses. This can enable a reduction in overall costs, such as a more compact design or higher efficiency.

Materials – Product family Durostone® CR

Durostone® CR is available in different grades depending on the requirements for the insulating components.

Grades	Properties
Durostone® CR-S	• Excellent elctrical properties without onset of partial discharge • Good mechanical properties • Temperature class F (155 °C)
Durostone® CR-S2	• Very good mechanical properties • Very good electrical properties • Temperature class F (155 °C)
Durostone® CR205	• Excellent mechanical properties • Very good electrical properties • Temperature class H (180 °C)
Durostone® CR-XM	• High dimensional stability • Very good mechanical properties • Good electrical properties • Temperature class H (180 °C)

Durostone® materials for fasteners:

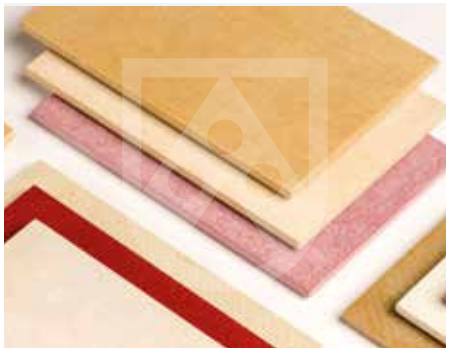
Next to Durostone® CR we offer different Durostone® grades especially for fasteners.

Standard size: M8 – M30 | Threads in accordance with ISO 965 | Tolerance zone 6 g, all sizes in mm

Threaded rods	Properties	Sizes
Durostone® UPR S19	• Very good electrical properties • Good mechanical properties • Temperature class F (155 °C)	Sizes up to M52 and 5,300 mm are possible
Durostone® EPR S6	• Excellent mechanical properties • Very good electrical properties • Temperature class H (180 °C)	Sizes up to M52 and 5,300 mm are possible
Durostone® EPR S1	• Very good mechanical properties • Good electrical properties • Temperature class H (180 °C)	Standard length 1,900 mm
Nuts	**Properties**	**Nut height**
Durostone® EPM S7	Available as square and hexagonal nuts	Standard nut height: H = D or H = 2 D
Durostone® UPR S19	Available as square and hexagonal nuts	Standard nut height: H = D or H = 2 D

On request, we also manufacture Durostone® threaded rods and nuts in other grades and sizes. In addition to the metric sizes, we manufacture Durostone nuts also in inch thread sizes.

Delivery programme – Durostone®



Sheets

Standard sizes:

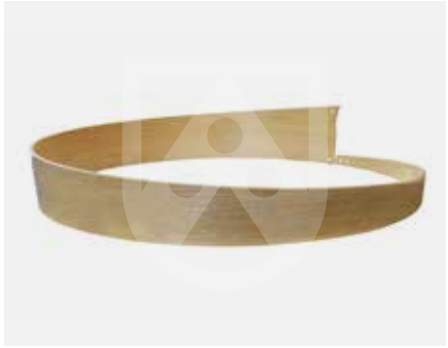
- 2,380 x 1,160 (Durostone® CR-S2)
- 2,400 x 1,220 (Durostone® CR-S)
- 2,000 x 1,120 (Durostone® CR205)
- 3,000 x 1,120 (Durostone® CR205)
- Thickness 4 – 80 mm (Durostone® CR-S)
- Thickness 4 – 150 mm (Durostone® CR-S2, Durostone® CR205)

Maximum sizes:

- 4,200 x 3,400 mm
- 12,000 x 950 mm

Grades:

- Durostone® CR-S
- Durostone® CR-S2
- Durostone® CR205



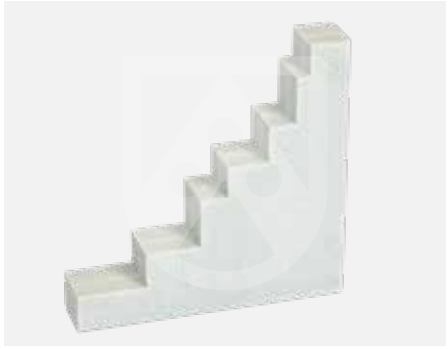
Wound ring

Dimensions:

- Diameter up to 3,500 mm
- Height up to 1,600 mm
- Wall thickness: 15 – 500 mm

Grades:

- Durostone® CR-XM



Machined parts

According to customers drawing:

- Machining in tight tolerances on modern 5-axis CNC-machines
- Up to 5,500 mm length
- Up to 3,500 mm diameter

Grades:

- Durostone® CR-S
- Durostone® CR-S2
- Durostone® CR205
- Durostone® CR-XM

Röchling

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